CITY OF SCOTTSDALE

Abbreviated Water and Sewer Needs

FINAL Basis of Design Report

☐ APPROVED

☑ APPROVED AS NOTED

☐ REVISE AND RESUBMIT

CITY OF SCOTTSDALE
SCOTTSDALE WATER
9379 E San Salvador Dr.
Scottsdale, AZ 85258

Disclaimer: If approved; the approval is granted under the condition that the final construction documents submitted for city review will match the information herein. Any subsequent changes in the water or sewer design that materially impact design criteria or standards will require re-analysis, re-submittal, and approval of a revised basis of design report prior to the plan review submission.; this approval is not a guarantee of construction document acceptance.
For questions or clarifications contact the Water Resources Planning and Engineering Department at 480-312-5685.

BY ldillon **DATE** 12/1/2020

SEE PAGE 2 FOR REVIEW COMMENTS.

WATER AND WASTEWATER BASIN OF DESIGN REPORT

✓Centum Health Scottsdale, Arizona

FINAL Basis of Design Report (DR or PP)
❑ APPROVED
✓ APPROVED AS NOTED
❑ REVISE AND RESUBMIT

Reviewed By:
carollo
On behalf of the Scottsdale Water Resources Department

Review checked and supplemented by LDillon above

DISCLAIMER: If approved, the approval is granted under the condition that the final construction documents submitted for city review will match the information herein. Any subsequent changes in the water or sewer design that materially impact design criteria or standards will require re-analysis, re-submittal, and approval of a revised basis of design report prior to the plan review submission; this approval is not a guarantee of construction document acceptance. For questions or clarifications contact the Water Resources Planning and Engineering Department at 480-321-5685

REVIEWER: B. BERNARD, P.E.
DATE: 11/30/2020

SEE PAGE 2 FOR REVIEW COMMENTS.

Prepared for:

✓Centum Health Properties
1300 N. 12th St. Suite 513
Phoenix, AZ 85006

Registered Professional Engineer (Civil)
CERTIFICATE NO. 67407
JEFFREY C. BOYD
Date Signed 11/11/20
ARIZONA, U.S.A.
Exp. Date 09/30/21

Prepared by:

Kimley»Horn

291247001
November 2020

P: (602) 944-5500

✓14-DR-2020
14-DR-2020 V3
11/12/2020
12/17/20

CENTUM HOSPITAL SCOTTSDALE - 7331 E. OSBORN

CASE FILE 14-DR-2020_V2 - FINAL WATER AND WASTEWATER BOD REPORTS

CAROLLO ENGINEER'S CASE FILE REVIEW COMMENTS - 11/30/2020

Ordinance Issues:

1. Note to the Submitter/Developer, as per section 6-1.000 and 7-1.000 of the DSPM, Developers may be required to install, at their expense, all on-site and off-site improvements, if required.

2. Per DS&PM 6-1.200 and 7-1.200, the Water Resources Department may stipulate additional supplemental information in lieu of, or in addition to, a BOD report to satisfy any concerns or questions they may have.

Policy and Design Related Issues:

3. Section 3.4 - Wastewater Analysis: Submitter/Developer must confirm through either flow metering, or with the City of Scottsdale Water Resources Department, that adequate sewer capacity is available in the existing 8-inch sewer in N. Drinkwater Blvd. that you are proposing to connect to and send flow into.

Technical Corrections to be Resolved:

4. Appendix B - Preliminary Utility Plan - See comments provided on the Preliminary Utility Plan markup

LDillon, Address as-noted comments below and within the report with or prior to plan submittal:

1.) New private sewer does not need to be 8" and can be 6" and can make horizontal turns per plumbing code.
2.) New private sewer needs to conform with requirements of DS&PM 7-1.414. Confirm for plan submittal.
3.) DS&PM 7-1.202 Delineation point of public versus private sewer needs to be called out. All private sewer to be called out as private on the drawings.
4.) DS&PM 7-1.406 & SRC 49-96. Refer to utility plan comments. Note that the new private sewer layout will be dependent on whether a monitoring manhole is required for water quality regulatory purposes. Confirm requirement with the City Water Quality Division's Carie Wilson @ 480-312-8718. If required, the Water Resource Engineering department will provide guidance and the applicant shall be required to approve the design of the monitoring manhole per a technical submittal. The requirement to install a monitoring manhole and the relevant design submittal should be completed prior to submitting improvement plans. For further info or questions please contact Levi Dillon @ 480-312-5319.
5.) If the backflow preventer is not directly adjacent to the meter then the line but be slurry backfilled between them. DS&PM 6-1.417, C.
6.) Given the flows calculated per this report a 4" compound meter would likely be adequate for the site. Existing meter is 6". Difference in development fee between 6" and 4" meter could be applied as a meter credit to reduce the development fee for any newly added meter, e.g. landscape. Meter sizing should be thoroughly reviewed in detailed design using fixture count and design flow from plumbing code. These values should then be compared to the values Figure 6-1.4 in DSPM chapter 6. Note these values assume a 1.5 safety factor is applied to the fixture design flows.
7.) Confirm with City fire plan review staff that fire line can be shared between separate structures. Consider looping the 6" fire line out to Osborn Drive.
8.) Confirm with City fire plan review staff that an FDC is not required per DS&PM 6-1.507
9.) Fire line isolation valve required. Refer to fire line detail 2362-2

CONTENTS

APPENDICES

1.0 INTRODUCTION

Kimley-Horn and Associates, Inc. has prepared this Water and Wastewater Basis of Design Report for the proposed Centum Health development at the northwest corner of Wells Fargo Ave and Drinkwater Blvd in Scottsdale, Arizona. This report will demonstrate that the proposed project conforms to the City of Scottsdale design requirements.

Centum Health, the "project", encompasses approximately 2.4 net acres and contains an existing 56,331 gross square foot, five-story commercial medical office building. Proposed development includes 38,784 gross square foot addition to the existing commercial medical building and a 115,858 gross square foot, two-story parking garage. The top floor of the parking garage (Level P2) at 56,920 square feet will be open to the air and match elevation of the 2nd floor of the existing building with some covered parking stalls. The bottom floor of the garage (Level P1) at 58,938 square feet will be below grade to match the 1st floor elevation of the existing building. Level P1 will be the only floor sprinklered as the Level P2 is open air. The project lies within a portion of the Southwest Quarter of Section 26, Township 2 North, Range 4 East of the Gila and Salt River Baseline and Meridian in Maricopa County, Arizona. More specifically, the site is bounded by existing Ashford Scottsdale apartments to the west, Osborn Drive to the north, Wells Fargo Avenue to the east and Drinkwater Boulevard to the south. The site slopes from the north to the south at approximately 0.5%. See **Appendix A** for the Vicinity Map.

2.0 DOMESTIC WATER ANALYSIS

2.1 INTENT AND SCOPE

The intent of this section is to evaluate the potable water infrastructure for the proposed development. As a result of this analysis, it will be determined if the potable water infrastructure is capable of satisfying the projected water demands for the proposed development in accordance with the City of Scottsdale Design Standards & Policies Manual (**Reference 1**) and the 2015 International Fire Code (**Reference 2**) for fire prevention.

2.2 GENERAL THEORY

The water system modeling program Water CAD, developed by Haestad Methods, is used to model the water system servicing the proposed development. The program uses the fluid mechanic head loss theory known as the Hazen-Williams method. This is the typical method used to evaluate water distribution systems.

2.3 DOMESTIC WATER SUPPLY

There is an existing six-inch public ACP water main located east of the site along Wells Fargo Ave and an existing 8-inch public ACP water main located north of the site along East Osborn Drive.

An existing six-inch DIP private fire line connects to the six-inch ACP public water main in Wells Fargo Ave. The existing private six-inch fire line currently feeds the existing building and is connected through an existing backflow preventer located on the east side of the site. With the proposed development, the existing 6" private fire line will be re-routed, and existing backflow preventer removed. The new fire riser room in the building will include a new backflow. Proposed Level P1 parking garage will be the only level sprinklered and will be serviced by connecting to the existing six-inch private fire line re-routed on site and equipped with separate fire riser and backflow preventer in the garage. An existing 6-inch private domestic water service feeds the existing building that also connects to the existing six-inch ACP main in Wells Fargo Ave. The domestic service runs through an existing 6-inch meter and vault (confirmed with COS Water and Sewer Department) located east of the site. The 6" private domestic water line will also need to be re-routed to the existing building connection and backflow preventer installed on site with the proposed development. It is assumed the existing water feed service is adequate to service the proposed development expansion of the existing building and construction of the 2-story garage. Refer to **Appendix B** for the Preliminary Utility Plan.

58,938 SF

?

Residual and static pressures were obtained from a flow test performed on two fire hydrants (one flow and one pressure) in Wells Fargo Ave and Drinkwater Blvd respectively, by EJ Flow Tests on April 9, 2020. Results of the test were reflected at GPM @ 30 PSI with 19% Safety Factor. See **Appendix D** for the Fire Flow Test results.

2.4 INTERNATIONAL FIRE CODE, 2015

According to the City of Scottsdale Fire Department, the 2015 International Fire Code (IFC) with City of Scottsdale Amendments is currently the governing code with respect to fire protection requirements. The IFC evaluates the building construction type, occupancy descriptions, and square footage to set minimum fire flow requirements with regards to a particular development.

The proposed building and garage are Construction Type II-B. Per Table B105.1 of **Reference 2**, the required fire flow is 6,500 gallons per minute for the Building with Gross Area of 95,115 SF and 5,250 gallons per minute for the Garage, Level P1 only at 58,938 SF. Level P2 of the proposed Parking Garage is open to air thus not sprinklered. A reduction in fire-flow of 75% percent is allowed when the building/garage is equipped with an approved fire sprinkler system. The building and parking garage will be equipped with separate and approved fire sprinkler systems. The minimum fire flow requirements per the IFC 2015 for the proposed building and garage are shown in Table 1. Table 1 also shows the required building fire flow based upon a maximum fire flow reduction of 75% allowed by the IFC 2015. See **Appendix C** for IFC 2015 Table B105.1.

Table 1 Required Building Fire Flows

IFC 2015

Building	Building Construction Type	Building Area (sf)	Required Fire Flow per IFC 2012 (gpm)	Reduction	Actual Required Fire Flow with Reduction (gpm)
Medical Office Center	II-B	95,115	6,500	75%	1,625
Parking Garage (Level P1 Only)	II-B	58,938	5,250	75%	1,313

2.5 WATER DEMANDS

According to the guidelines provided in Figure 6-1.2 of **Reference 1**, the proposed development will add the following demands to the existing water system for Average Day Demand (ADD), Maximum Day Demand (MDD), and Peak Hour Demand (PHD):

Table 2: Domestic Water Demands

Building	Building Area (SF)	Total Demand[1] (GPM/SQ.FT.)	ADD[1] (GPM)	MDD[2] (GPM)	PHD[3] (GPM)
Existing Medical Center	48,800	1.11 E-03	54.17	108.34	189.59
Proposed Addition	46,315	1.11 E-03	51.41	102.82	179.93
Total Demand	**95,115**	**1.11 E-03**	**105.58**	**211.16**	**369.52**

Notes:
1. For Commercial/Retail land use, average day demand is 0.8 gpd/sq.ft. or 1.11 E-03 gpm/sq.ft..
2. Maximum day demand defined as 2 times the average day demand.
3. Peak hour demand defined as 3.5 times the average day demand.

Two water analyses were performed to evaluate the existing adjacent off-site water infrastructure and the proposed on-site water system:

1. Peak Hour
2. Maximum Day Demand + Fire Flow

The system was analyzed for the worst-case scenario to ensure that the existing public water infrastructure can maintain a minimum pressure of 50 psi for the Peak Hour demand at highest Finish Floor Elevation of 1235.07 of the existing building, and 30 psi for the Maximum Day plus Fire Flow demand. See Appendix D for water model layout to identify nodes and pipes.

See **Appendix D** for the Fire Flow Test and Water CAD Analysis and Layout. A summary of the water analysis results for the project is tabulated below:

Table 3 Domestic Water Model Result Summary

Criteria	Peak Hour Demand	Constraint	Peak Hour Pressure at Demand	Node with Minimum Pressure
Minimum Pressure	370 gpm	50 psi	80 psi	BLDG DW
Meets Criteria?	-	-	Yes	

Table 4 Fire Flow Water Model Result Summary For Building Fire Demand

SEEMS TO BE PEAK HOUR + FIRE FLOW? ACCEPTABLE BECAUSE PHD IS > MDD

Criteria	Max Day + Fire Flow Demand	Constraint	Max Day + Fire Flow Pressure at Demand	Node with Minimum Pressure
Minimum System Pressure	1,995 gpm	30 psi	59 psi	BLDG FIRE
Meets Criteria?	-	-	Yes	

Table 5 Fire Flow Water Model Result Summary For Garage Fire Demand

Criteria	Max Day + Fire Flow Demand	Constraint	Max Day + Fire Flow Pressure at Demand	Node with Minimum Pressure
Minimum System Pressure	1,683 gpm	30 psi	68 psi	Garage FIRE
Meets Criteria?	-	-	Yes	

Table 6 Fire Hydrant Flow Water Model Result Summary

Criteria	Fire Flow Demand	Constraint	Fire Flow Pressure at Demand	Meets Criteria?
Hydrant 1	1,625 gpm	20 psi	23	YES
Hydrant 2	1,625 gpm	20 psi	28	YES

*Fire Flow Demand based on Bldg Demand of 1,625 gpm because it's greater than demand of Garage at ~~1,250~~ gpm.

1,313 GPM?

3.0 WASTEWATER COLLECTION SYSTEM

3.1 INTENT AND SCOPE

The intent of this section is to evaluate the proposed sewer infrastructure and wastewater design flows for the development. As a result of this analysis, it will be determined if the sewer infrastructure is capable of supporting the proposed development in accordance with the City of Scottsdale Design Standards & Policies Manual (**Reference 1**).

3.2 SEWER INFRASTRUCTURE

There is an existing private eight-inch VCP sewer tap running through the west portion of the property that connects to the sewer main in Drinkwater Blvd., slope equals 1.38%±, extending just past the south property line of the proposed site.

With the proposed improvements, the existing eight-inch private sewer will be relocated further west outside the proposed garage footprint and be replaced with eight-inch PVC sewer service with a slope of 1.38% and connect to the same existing eight-inch sewer stub as before. Refer to **Appendix B** for the Preliminary Utility Plan.

At this slope only a 6" pipe is needed, refer to utility plan for guidance

3.3 WASTEWATER DESIGN FLOWS

The following calculations are based on information provided in Section 7-1.403 of **Reference 1**:

Table 3: Wastewater Design Flow

Building	Building Area (SF)	Average Daily Flow[1] (GPD)	Peak Flow[3] (GPD)	Peak Flow (GPM)
Medical Office Center	95,115	47,558	142,676	99.1

Notes:

1. Wastewater flows are based on 0.5 per sq. ft. per day for commercial/retail use.
2. Design peaking factor for ~~resort hotel~~ is 3.

COMMERCIAL/RETAIL

3.4 ANALYSIS (SEE STANDARDS)

Sanitary sewer lines will be designed to maintain a maximum depth to diameter ratio (d/D) of 0.65 and minimum full flow velocity of 2.5 ft/sec and a maximum full flow velocity of 10.0 ft/sec in the ultimate peak flow condition. To verify the proposed eight-inch sewer on-site has adequate capacity to serve the project, design flows were analyzed with Flow Master using minimum and maximum pipe design slopes. The sewer capacity for an eight-inch pipe at the minimum design slope of 0.52% is 296 gpm. Refer to **Appendix E** for the Sewer Capacity Calculations.

MUST CONFIRM WITH FLOW METERING OR WITH THE COSWRD THAT ADEQUATE SEWER CAPACITY IS AVAILABLE IN THE EXISTING 8-INCH SEWER IN N. DRINKWATER BLVD YOU ARE CONNECTING TO.

water demand/building space is doubling, therefore previous sewer peak flows assumed to be around 50gpm. 50gpm peak increase will not have a significant capacity impact on the existing 8" public sewer.

4.0 CONCLUSION

Water

The proposed and existing on-site water system as outlined by this analysis appears adequate and sufficient to meet the required fire flow demand and peak domestic water demand for the proposed Centum Health development near the northwest corner of Wells Fargo Ave and Drinkwater Blvd in Scottsdale, Arizona.

Wastewater

only a 6" private sewer is needed

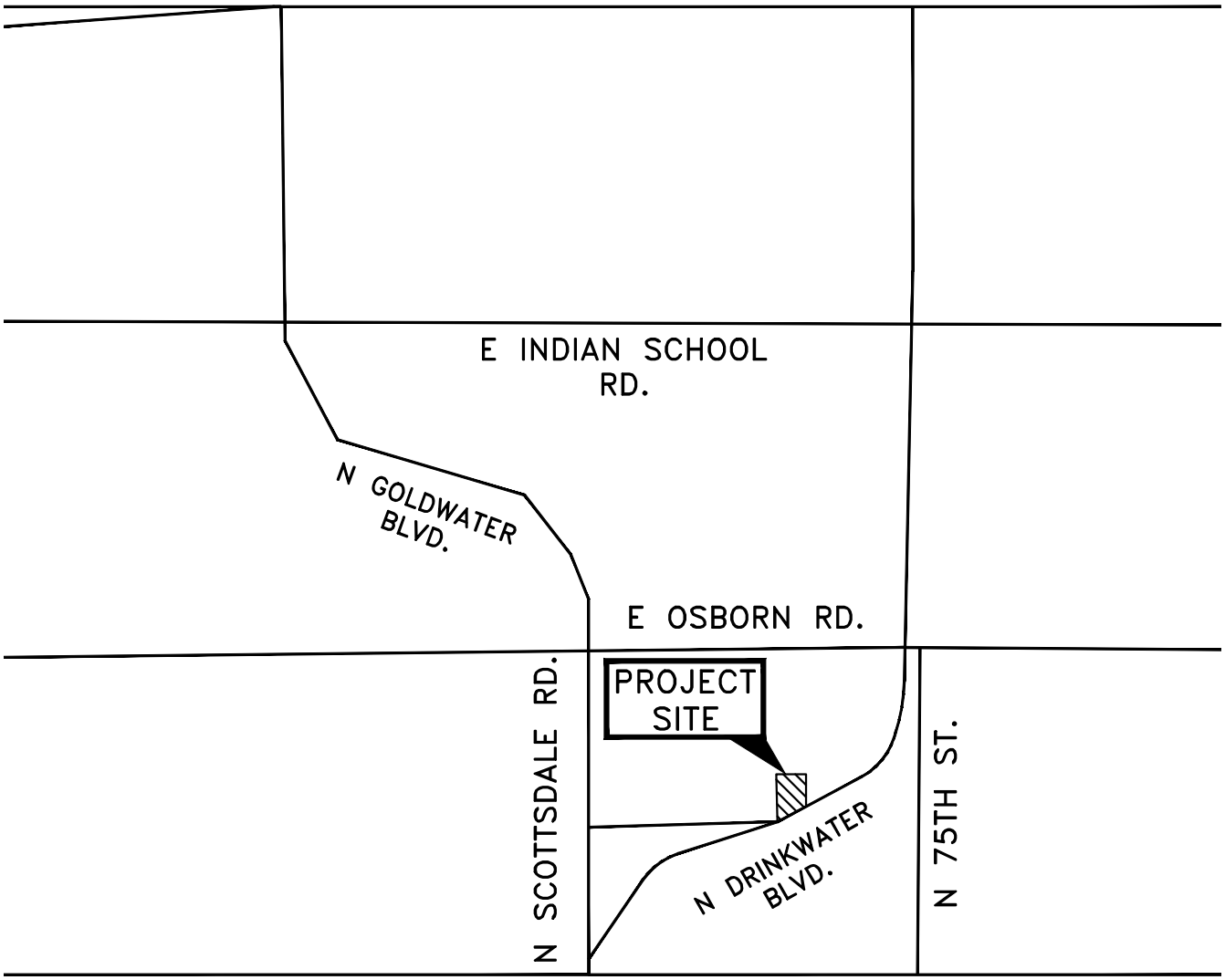
This development proposes to re-route the existing eight-inch sewer and re-connect the building sewer services to the existing eight-inch private sewer stub south of the site. The proposed eight-inch PVC private sanitary sewer service has adequate capacity for the flows generated by the proposed buildings and their associated uses. Refer to **Appendix B** for the Sewer Capacity Calculations.

5.0 REFERENCES

1. City of Scottsdale, *Design Standards and Policies Manual.* 2018.

2. International Code Council, *2015 International Fire* Code. May 2

Appendix A – Vicinity Map



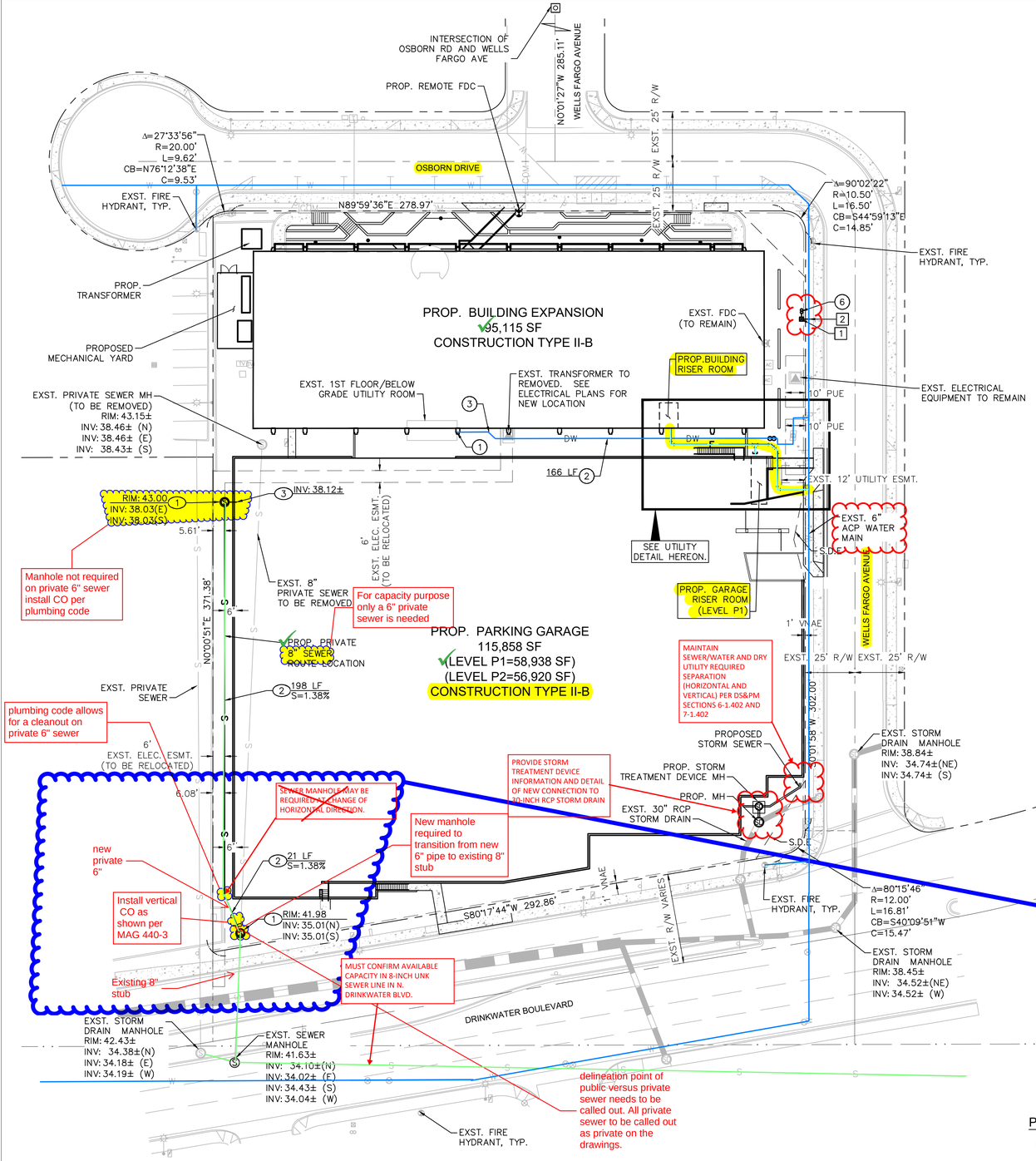
NORTH

VICINITY MAP

SCOTTSDALE, AZ
N.T.S.

Kimley»Horn

Appendix B – Preliminary Utility Plan



Manhole not required on private 6" sewer install CO per plumbing code

For capacity purpose only a 6" private sewer is needed

plumbing code allows for a cleanout on private 6" sewer

delineation point of public versus private sewer needs to be called out. All private sewer to be called out as private on the drawings.

PUBLIC WATER NOTES

1. 1" IRRIGATION WATER METER PER COS STD DET 2330, METER BOX PER MAG STD DET 320. METER TO BE INSTALLED BY CITY FORCES.
2. INSTALL 1" WATER SERVICE LINE CONNECTION PER COS STD DET 2330.

PRIVATE DOMESTIC WATER NOTES

1. BUILDING DOMESTIC WATER CONNECTION, REF MEP PLANS FOR CONTINUATION.
2. INSTALL 6" MORTAR LINED DIP CL 350 WITH POLYWRAP DOMESTIC WATER LINE. LENGTH PER PLAN. MIN 3' COVER. BEDDING AND BACKFILL PER MAG SPEC 601.
3. CONNECT TO EXISTING 6" PRIVATE DOMESTIC WATER LINE.
4. EXISTING 6" WATER METER.
5. INSTALL 6" DOUBLE CHECK VALVE BACKFLOW PREVENTION ASSEMBLY PER COS STD DET 2351. TO BE SCREENED BY LANDSCAPE.
6. 1" IRRIGATION WATER DOUBLE CHECK VALVE BACKFLOW PREVENTION ASSEMBLY PER COS STD DET 2352. REF TO IRRIGATION PLANS FOR CONTINUATION.

PRIVATE SEWER NOTES

1. INSTALL 48" SEWER MANHOLE PER MAG STD DET 420, INVERTS PER PLANS. CONTRACTOR SHALL VERIFY INVERT AND LOCATION OF EXISTING SEWER AND NOTIFY ENGINEER OF SAME PRIOR TO CONSTRUCTION.
2. INSTALL 8" SDR 35 PVC SEWER SERVICE, LENGTH AND SLOPE PER PLAN.
3. CONNECT TO 8" BUILDING SEWER. REF TO MEP PLANS FOR SEWER ROUTING THROUGH GARAGE AND CONNECTION TO BUILDING.

not clear to me why this needs to be an 8-inch sewer

LEGEND

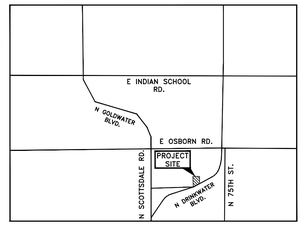
- PROPERTY LINE
- RIGHT OF WAY LINE
- STREET CENTERLINE
- EASEMENT LINE
- EXISTING SEWER MAIN
- EXISTING WATER MAIN
- PROPOSED WATER MAIN
- PROPOSED SEWER MAIN
- PROPOSED STORM DRAIN
- EXSTING STORM DRAIN
- EXISTING SANITARY SEWER MANHOLE
- PROPOSED SANITARY SEWER MANHOLE
- PROPOSED SANITARY SEWER CLEANOUT
- EXISTING FIRE HYDRANT
- PROPOSED FIRE HYDRANT
- PROPOSED CATCH BASIN

DEVELOPER/OWNER
CENTUM HEALTH PROPERTIES
1300 NORTH 12TH STREET SUITE 513
PHOENIX, AZ
PH: (503) 954-7287
CONTACT: STU MONSON

CIVIL ENGINEER
KIMLEY-HORN AND ASSOCIATES, INC.
7740 N. 16TH STREET, SUITE 300
PHOENIX, ARIZONA 85020
PH: (602) 678-3403
CONTACT: JEFF BOYD, PE

ARCHITECT
CORGAN
1850 NORTH CENTRAL AVENUE, SUITE 300
PHOENIX, AZ 85004
PH:(602) 302-6400
CONTACT:SHANE WILLIAMS, AIA, ACHA, LSS

LAND SURVEYOR
SURVEY INNOVATION GROUP, INC
7301 EAST EVANS ROAD
SCOTTSDALE, ARIZONA 85260
PH: (480) 922-0780
CONTACT: JASON SEGNERI, P.L.S.



VICINITY MAP
SCOTTSDALE, AZ
N.T.S.

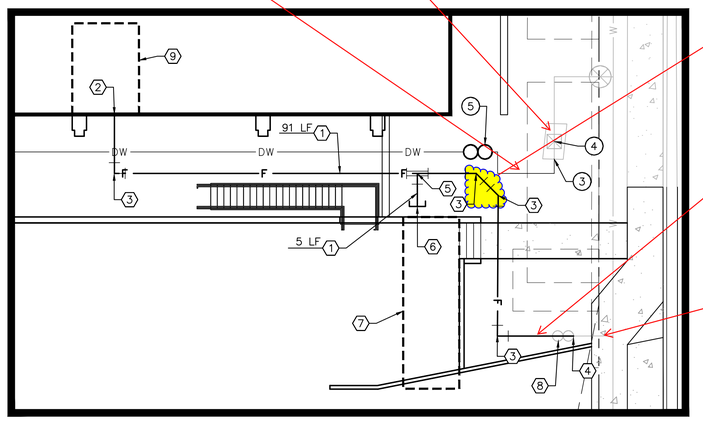
BENCHMARK
CITY OF SCOTTSDALE BRASS CAP IN HANDHOLE 0.4' DOWN AT THE INTERSECTION OF SCOTTSDALE ROAD AND OSBORN ROAD
ELEVATION = 1246.67' (NAVD-88)

BASIS OF BEARING
THE SOUTH LINE OF THE SOUTHEAST QUARTER OF SECTION 26, TOWNSHIP 2 NORTH, RANGE 4 EAST OF THE GILA AND SALT RIVER BASE AND MERIDIAN, MARICOPA COUNTY, ARIZONA. SAID LINE BEARS S89°50'05"W.

NOTES:
1. ADD 1200' TO ALL ELEVATIONS.
2. ALL ELEVATIONS ARE INVERT ELEVATIONS, UNLESS OTHERWISE NOTED.

Given the flows calculated per this report 1 4" compound meter would likely be adequate for the site. Difference in development fee between 6" and 4" meter could be applied as a meter credit to reduce the development fee for any newly added meter, e.g. landscape. Meter sizing should be throughly reviewed in detailed design using fixture count and design flow from plumbing code. These values should then be compared to the values Figure 6-1.4 in DSPM chapter 6. Note these values assume a 1.5 safety factor is applied to the fixture design flows.

If the backflow preventer is not directly adjacent to the meter then the line but be grout backfilled between them. DS&PM 6-1.417, C.



Confirm with City fire plan review staff that fire line can be shared between separate structures. Consider looping the 6" fire line out to Osborn Drive.

Confirm with City fire plan review staff that an FDC is not required per DS&PM 6-1.507

Isolation valve required. Refer to fire line detail 2362-2

UTILITY DETAIL
SCALE (H): 1"=10'

This configuration will need to be modified if a monitoring manhole is required. Requirement policy to right.

Scottsdale Design Standards and Policy Manual
MONITORING VAULTS AND MANHOLES7-1.406
A.Monitoring Vaults
The Water Quality Division has sole discretion when to require a developer to install a monitoring vault for testing wastewater flow and composition. Generally, properties in industrial land use areas with a projected wastewater discharge of 25,000 gallons per day will be required to install a monitoring vault per COS Standard Detail No. 2460.
A.Monitoring Manholes
The Water Quality Division has sole discretion when to require a developer to install a monitoring manhole. Generally, commercial developments that will use chemicals or solvents are required to install monitoring manholes. Monitoring manholes shall be constructed per MAG Standard Detail No. 420 with a straight channel and no taps or bends for 10 feet upstream or downstream or as approved by the Water Resources Department. Monitoring manholes on sewer services with a peak flow greater than 40 gallons per minute must be approved by the Water Resources Department.
Monitoring vaults and manholes shall be in a minimum 20-foot-wide easement that extends from the manhole to the existing public wastewater system and shall be designed for access always to city crews.

Scottsdale Revised Code
Sec. 49-96. - Monitoring manholes.
When required by the City, the owner of any property served by a building sewer discharging any industrial wastes or that has the potential to discharge industrial wastes, shall install a suitable monitoring manhole or monitoring vault in the building sewer to facilitate observation, measurement and sampling of the industrial wastes. Such monitoring manhole or monitoring vault, when required, shall be accessible and safely located and shall be constructed in accordance with plans approved by the City. The monitoring manhole or monitoring vault shall be installed by the industrial user at his expense and shall be maintained by him so as to be safe and accessible at all times.
(Ord. No. 2623, § 2, 12-20-93; Ord. No. 3586, § 1, 9-21-04, eff. 1-1-05; Ord. No. 4308, § 1(Res. No. 10799, § 1(Exh. A)), 5-23-17, eff. 7-1-17)

PRIVATE FIRELINE NOTES

1. 6" CLASS 350 DIP WATER MAIN POLYWRAPPED WITH TRACER WIRE, MIN 3' COVER. BEDDING AND BACKFILL PER MAG SPEC 601. LENGTH PER PLAN.
2. BUILDING FIRELINE CONNECTION. REF TO MEP PLANS FOR CONTINUATION TO BUILDING RISER AND BACKFLOW.
3. INSTALL 6" BEND WITH RESTRAINED JOINTS PER MAG STD DET 303.
4. CONNECT TO EXISTING 6" DIP FIRELINE.
5. INSTALL 6"X6" TEE.
6. GARAGE FIRELINE CONNECTION. REF MEP PLANS FOR CONTINUATION TO GARAGE RISER AND BACKFLOW.
7. PROPOSED GARAGE FIRE RISER ROOM (LEVEL P2). SEE ARCH PLANS.
8. EXISTING FIRE BACKFLOW TO BE REMOVED. NEW BACKFLOWS LOCATED IN EACH RISER ROOM FOR BUILDING AND GARAGE. REF TO ARCH PLANS.
9. PROPOSED BUILDING FIRE RISER ROOM. SEE ARCH PLANS.

NORTH

GRAPHIC SCALE IN FEET
0 15 30 60

Contact Arizona 811 at least two full working days before you begin excavation
ARIZONA811
Call 811 or click Arizona811.com

Kimley»Horn © 2020
7740 North 16th Street,
Suite 300
Phoenix, Arizona 85020
(602) 944-5500

ISSUES
1	
2	
3	

REVISIONS

PRELIMINARY
FOR REVIEW ONLY
NOT FOR CONSTRUCTION
Kimley»Horn
ENGINEER JEFF BOYD
PE NO.67407 DATE 11/20

SCALE (H):	1"=30'
SCALE (V):	NONE
DRAWN BY:	JCB
DESIGN BY:	JCB
CHECK BY:	MLD
DATE:	11/11/2020

Centum Scottsdale MOB Core and Shell
7331 E Osborn Dr.
Scottsdale, AZ 85251

KEYPLAN

PRELIMINARY UTILITY PLAN

JOB	291247001
DATE	11/11/2020
SHEET	23.4

14-DB-2020
14-DB-2020 3
11/12/2020
12/17/20

Appendix C – Fire Flow Requirements from 2015 IFC

SECTION B105 FIRE-FLOW REQUIREMENTS FOR BUILDINGS

B105.1 One- and two-family dwellings.
The minimum fire-flow and flow duration requirements for one- and two-family *dwellings* having a fire-flow calculation area that does not exceed 3,600 square feet (344.5 m^2) shall be 1,000 gallons per minute (3785.4 L/min) for 1 hour. Fire-flow and flow duration for *dwellings* having a fire-flow calculation area in excess of 3,600 square feet (344.5m^2) shall not be less than that specified in Table B105.1.

Exception: A reduction in required fire-flow of 50 percent, as *approved,* is allowed when the building is equipped with an *approved automatic sprinkler system.*

TABLE B105.1 MINIMUM REQUIRED FIRE-FLOW AND FLOW DURATION FOR BUILDINGS

FIRE-FLOW CALCULATION AREA (square feet)					FIRE-FLOW (gallons per minute)[b]	FLOW DURATION (hours)
Type IA and IB[a]	Type IIA and IIIA[a]	Type IV and V-A[a]	Type IIB and IIIB[a]	Type V-B[a]		
0-22,700	0-12,700	0-8,200	0-5,900	0-3,600	1,500	2
22,701-30,200	12,701-17,000	8,201-10,900	5,901-7,900	3,601-4,800	1,750	
30,201-38,700	17,001-21,800	10,901-12,900	7,901-9,800	4,801-6,200	2,000	
38,701-48,300	21,801-24,200	12,901-17,400	9,801-12,600	6,201-7,700	2,250	
48,301-59,000	24,201-33,200	17,401-21,300	12,601-15,400	7,701-9,400	2,500	
59,001-70,900	33,201-39,700	21,301-25,500	15,401-18,400	9,401-11,300	2,750	
70,901-83,700	39,701-47,100	25,501-30,100	18,401-21,800	11,301-13,400	3,000	3
83,701-97,700	47,101-54,900	30,101-35,200	21,801-25,900	13,401-15,600	3,250	
97,701-112,700	54,901-63,400	35,201-40,600	25,901-29,300	15,601-18,000	3,500	
112,701-128,700	63,401-72,400	40,601-46,400	29,301-33,500	18,001-20,600	3,750	
128,701-145,900	72,401-82,100	46,401-52,500	33,501-37,900	20,601-23,300	4,000	4
145,901-164,200	82,101-92,400	52,501-59,100	37,901-42,700	23,301-26,300	4,250	
164,201-	92,401-	59,101-	42,701-	26,301-	4,500	

183,400	103,100	66,000	47,700	29,300	
183,401-203,700	103,101-114,600	66,001-73,300	47,701-53,000	29,301-32,600	4,750
203,701-225,200	114,601-126,700	73,301-81,100	53,001-58,600	32,601-36,000	5,000
225,201-247,700	126,701-139,400	81,101-89,200	58,601-65,400	36,001-39,600	5,250
247,701-271,200	139,401-152,600	89,201-97,700	65,401-70,600	39,601-43,400	5,500
271,201-295,900	152,601-166,500	97,701-106,500	70,601-77,000	43,401-47,400	5,750
295,901-Greater	166,501-Greater	106,501-115,800	77,001-83,700	47,401-51,500	6,000
—	—	115,801-125,500	83,701-90,600	51,501-55,700	6,250
—	—	125,501-135,500	90,601-97,900	55,701-60,200	6,500
—	—	135,501-145,800	97,901-106,800	60,201-64,800	6,750
—	—	145,801-156,700	106,801-113,200	64,801-69,600	7,000
—	—	156,701-167,900	113,201-121,300	69,601-74,600	7,250
—	—	167,901-179,400	121,301-129,600	74,601-79,800	7,500
—	—	179,401-191,400	129,601-138,300	79,801-85,100	7,750
—	—	191,401-Greater	138,301-Greater	85,101-Greater	8,000

For SI: 1 square foot = 0.0929 m^2, 1 gallon per minute = 3.785 L/m, 1 pound per square inch = 6.895 kPa.

a. Types of construction are based on the *International Building Code.*

b. Measured at 20 psi residual pressure.

B105.2 Buildings other than one- and two-family dwellings.
The minimum fire-flow and flow duration for buildings other than one- and two-family *dwellings* shall be as specified in Table B105.1.

Exception: A reduction in required fire-flow of up to 75 percent, as *approved,* is allowed when the building is provided with an *approved automatic sprinkler system* installed in accordance with Section 903.3.1.1 or 903.3.1.2. The resulting fire-flow shall not be less than 1,500 gallons per minute (5678 L/min) for the prescribed duration as specified in Table B105.1.

Appendix D – Fire Flow Test and Water CAD Results and Layout

Flow Test Summary

Project Name:	EJFT 20118
Project Address:	7331 East Osborn Drive, Scottsdale, AZ 85251
Date of Flow Test:	2020-04-09
Time of Flow Test:	7:30 AM
Data Reliable Until:	2020-10-09
Conducted By:	Steven Saethre & Eder Cueva (EJ Flow Tests) 602.999.7637
Witnessed By:	Ray Padilla (City of Scottsdale) 602.541.0586
City Forces Contacted:	City of Scottsdale (602.541.0586)
Permit Number:	C61821

Note Scottsdale requires a max static pressure of 72 psi for safety factor.

Raw Flow Test Data

Static Pressure:	91.0 PSI
Residual Pressure:	80.0 PSI
Flowing GPM:	2,069
GPM @ 30 PSI:	5,219

Data with a 19 PSI Safety Factor

Static Pressure:	72.0 PSI
Residual Pressure:	61.0 PSI
Flowing GPM:	2,069
GPM @ 30 PSI:	4,266

Hydrant F_1

Pitot Pressure (1):	38	PSI
Coefficient of Discharge (1):	0.9	
Hydrant Orifice Diameter (1):	2.5	inches
Pitot Pressure (2):	38	PSI
Coefficient of Discharge (2):	0.9	
Hydrant Orifice Diameter (2):	2.5	inches

Project Site

Static-Residual Hydrant

Flow Hydrant

Main Size
6 inches

Distance Between F_1 and R
315 ft (measured linearly)

Static-Residual Elevation
1243 ft (above sea level)

Flow Hydrant (F_1) Elevation
1244 ft (above sea level)

Elevation & distance values are approximate

14-DR-2020
14-DR-2020_V3
11/12/2020
12/17/20

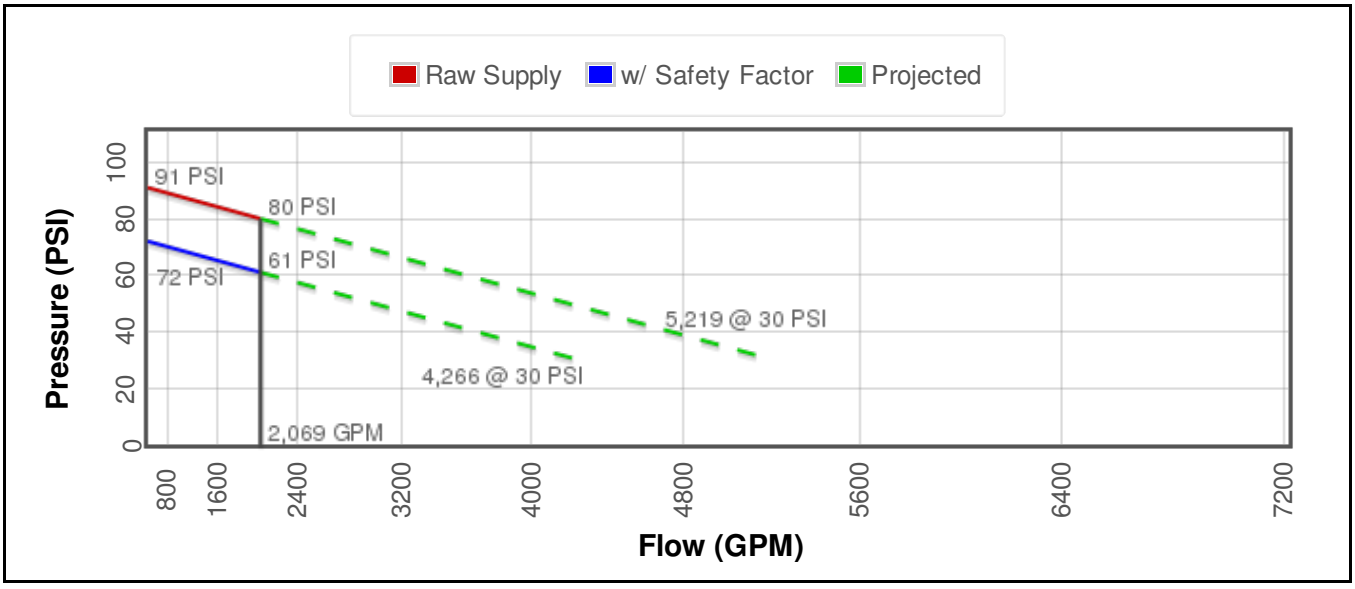
Flow Test Summary

Static-Residual Hydrant

Flow Hydrant (only hydrant F1 shown for clarity)

Approximate Project Site

Water Supply Curve $N^{1.85}$ Graph



14-DR-2020
14-DR-2020_V3
11/12/2020
12/17/20

OSBORN DRIVE

EXST. BUILDING

PROP. GARAGE

BLDG. FIRE

BLDG. DW

DW

GARAGE FIRE

J-2
H-2
P-4
P-5
J-7
J-5
P-6
P-10
P-9
P-1
R-1
P-11
J-6
PMP-1
P-8
P-2
P-7
P-3
H-2
J-1

WELLS FARGO AVENUE

DRINKWATER BOULEVARD

NORTH

GRAPHIC SCALE IN FEET
0 25 50 100

WATER CAD LAYOUT

Kimley»Horn

14-DR-2020
14-DR-2020_V3
10/12/2020
12/17/20

K:\PHX_Civil\291247001 - Centum Health Scottsdale\Reports\Water and Sewer\2nd DRB Sub\WaterCAD\WATER CAD EXHIBIT.dwg Nov 10, 2020 Jeff.Boyd
XREFS: X247001BM X247001UT X247001VF X247001GD

Pump Definition Detailed Report: Flow Test 2020-04-10

Active Scenario: Fire Flow

Element Details			
ID	64	Notes	
Label	Flow Test 2020-04-10		

Pump Definition Type			
Pump Definition Type	Standard (3 Point)	Design Head	153.87 ft
Shutoff Flow	0 gpm	Maximum Operating Flow	4,266 gpm
Shutoff Head	181.62 ft	Maximum Operating Head	46.20 ft
Design Flow	2,069 gpm		

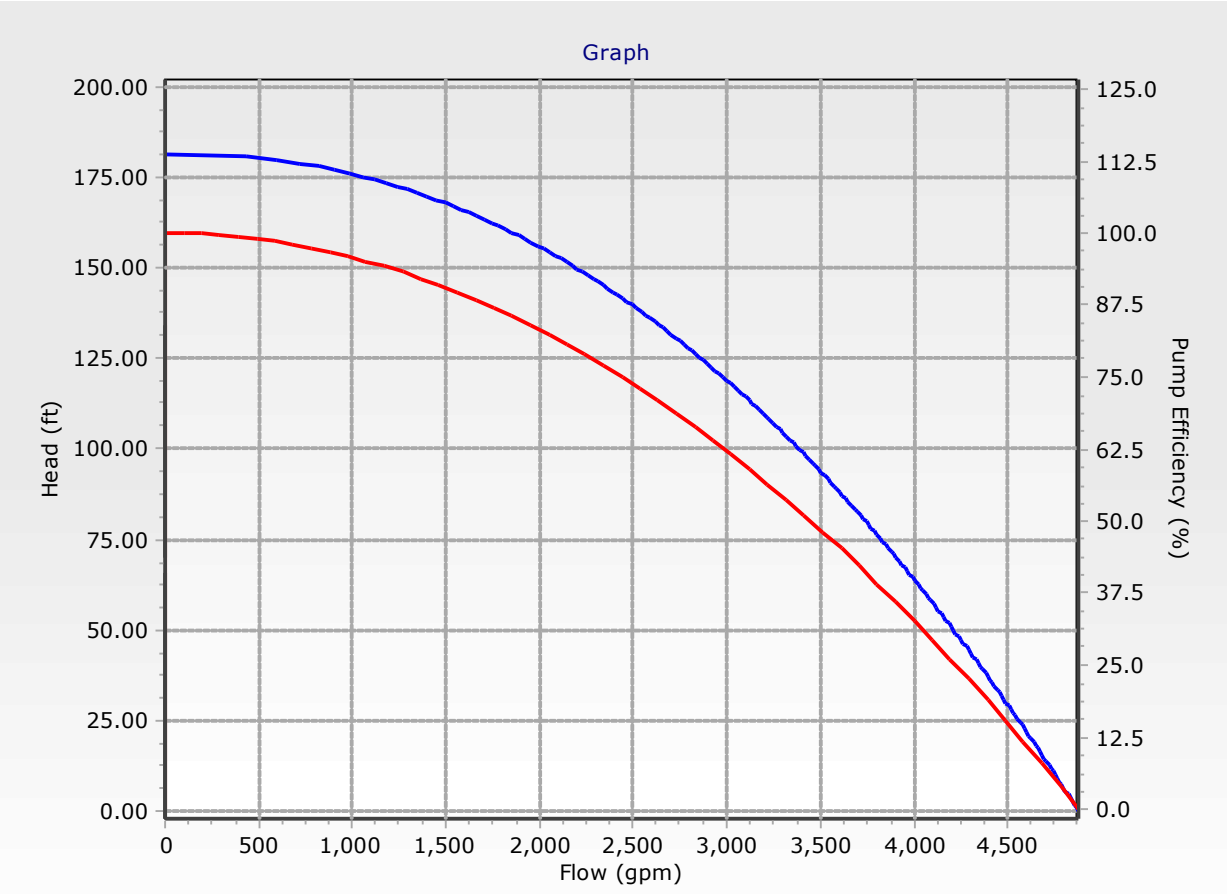
Pump Efficiency Type			
Pump Efficiency Type	Best Efficiency Point	Motor Efficiency	100.0 %
BEP Efficiency	100.0 %	Is Variable Speed Drive?	False
BEP Flow	0 gpm		

Transient (Physical)			
Inertia (Pump and Motor)	0.000 lb·ft²	Specific Speed	SI=25, US=1280
Speed (Full)	0 rpm	Reverse Spin Allowed?	True

Bentley Systems, Inc. Haestad Methods Solution Center
27 Siemon Company Drive Suite 200 W Watertown, CT 06795 USA
+1-203-755-1666

Pump Definition Detailed Report: Flow Test 2020-04-10

Active Scenario: Fire Flow



FlexTable: Pipe Table

Active Scenario: Peak Hour

Label	Start Node	Stop Node	Diameter (in)	Length (Scaled) (ft)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss (ft)
P-3	J-1	H-1	6.0	22	Asbestos Cement	140.0	0	0.00	0.00
P-4	J-2	H-2	6.0	11	Asbestos Cement	140.0	0	0.00	0.00
P-5	J-5	J-2	6.0	89	Asbestos Cement	140.0	0	0.00	0.00
P-6	J-6	J-5	6.0	36	Asbestos Cement	140.0	370	4.19	0.37
P-7	J-6	J-1	6.0	187	Asbestos Cement	140.0	0	0.00	0.00
P-9	J-7	Garage Fire	6.0	7	Ductile Iron	130.0	0	0.00	0.00
P-11	J-5	BLDG DW	6.0	195	Ductile Iron	130.0	370	4.19	2.29
P-8	J-6	J-7	6.0	49	Ductile Iron	130.0	0	0.00	0.00
P-10	J-7	BLDG Fire	6.0	51	Ductile Iron	130.0	0	0.00	0.00
P-1	R-1	PMP-1	6.0	18	Ductile Iron	130.0	370	4.19	0.21
P-2	PMP-1	J-6	6.0	14	Ductile Iron	130.0	370	4.19	0.16

FlexTable: Junction Table

Active Scenario: Peak Hour

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)	Pressure (Minimum) (psi)	Flow (Total Available) (gpm)	Flow (Total Needed) (gpm)	Fire Flow (Available) (gpm)
J-1	40.40	0	222.61	79	79	(N/A)	(N/A)	(N/A)
J-2	42.10	0	222.24	78	78	(N/A)	(N/A)	(N/A)
J-5	42.00	0	222.24	78	78	(N/A)	(N/A)	(N/A)
J-6	42.00	0	222.61	78	78	(N/A)	(N/A)	(N/A)
J-7	35.00	0	222.61	81	81	(N/A)	(N/A)	(N/A)
Garage Fire	35.00	0	222.61	81	81	(N/A)	(N/A)	(N/A)
BLDG Fire	35.00	0	222.61	81	81	(N/A)	(N/A)	(N/A)
BLDG DW	35.00	370	219.94	80	80	(N/A)	(N/A)	(N/A)

FlexTable: Pipe Table

Active Scenario: MDD + Bldg Fire Flow

Label	Start Node	Stop Node	Diameter (in)	Length (Scaled) (ft)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss (ft)
P-3	J-1	H-1	6.0	22	Asbestos Cement	140.0	0	0.00	0.00
P-4	J-2	H-2	6.0	11	Asbestos Cement	140.0	0	0.00	0.00
P-5	J-5	J-2	6.0	89	Asbestos Cement	140.0	0	0.00	0.00
P-6	J-6	J-5	6.0	36	Asbestos Cement	140.0	370	4.19	0.37
P-7	J-6	J-1	6.0	187	Asbestos Cement	140.0	0	0.00	0.00
P-9	J-7	Garage Fire	6.0	7	Ductile Iron	130.0	0	0.00	0.00
P-11	J-5	BLDG DW	6.0	195	Ductile Iron	130.0	370	4.19	2.29
P-8	J-6	J-7	6.0	49	Ductile Iron	130.0	1,625	18.44	8.89
P-10	J-7	BLDG Fire	6.0	51	Ductile Iron	130.0	1,625	18.44	9.30
P-1	R-1	PMP-1	6.0	18	Ductile Iron	130.0	1,995	22.63	4.84
P-2	PMP-1	J-6	6.0	14	Ductile Iron	130.0	1,995	22.63	3.71

FlexTable: Junction Table

Active Scenario: MDD + Bldg Fire Flow

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)	Pressure (Minimum) (psi)	Flow (Total Available) (gpm)	Flow (Total Needed) (gpm)	Fire Flow (Available) (gpm)
J-1	40.40	0	189.46	64	64	(N/A)	(N/A)	(N/A)
J-2	42.10	0	189.09	64	64	(N/A)	(N/A)	(N/A)
J-5	42.00	0	189.09	64	64	(N/A)	(N/A)	(N/A)
J-6	42.00	0	189.46	64	64	(N/A)	(N/A)	(N/A)
J-7	35.00	0	180.57	63	63	(N/A)	(N/A)	(N/A)
Garage Fire	35.00	0	180.57	63	63	(N/A)	(N/A)	(N/A)
BLDG Fire	35.00	1,625	171.27	59	59	(N/A)	(N/A)	(N/A)
BLDG DW	35.00	370	186.80	66	66	(N/A)	(N/A)	(N/A)

FlexTable: Pipe Table

Active Scenario: MDD + Garage Fire Flow

Label	Start Node	Stop Node	Diameter (in)	Length (Scaled) (ft)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss (ft)
P-3	J-1	H-1	6.0	22	Asbestos Cement	140.0	0	0.00	0.00
P-4	J-2	H-2	6.0	11	Asbestos Cement	140.0	0	0.00	0.00
P-5	J-5	J-2	6.0	89	Asbestos Cement	140.0	0	0.00	0.00
P-6	J-6	J-5	6.0	36	Asbestos Cement	140.0	370	4.20	0.37
P-7	J-6	J-1	6.0	187	Asbestos Cement	140.0	0	0.00	0.00
P-9	J-7	Garage Fire	6.0	7	Ductile Iron	130.0	1,313	14.89	0.91
P-11	J-5	BLDG DW	6.0	195	Ductile Iron	130.0	370	4.20	2.30
P-8	J-6	J-7	6.0	49	Ductile Iron	130.0	1,313	14.89	5.99
P-10	J-7	BLDG Fire	6.0	51	Ductile Iron	130.0	0	0.00	0.00
P-1	R-1	PMP-1	6.0	18	Ductile Iron	130.0	1,683	19.09	3.53
P-2	PMP-1	J-6	6.0	14	Ductile Iron	130.0	1,683	19.09	2.71

FlexTable: Junction Table

Active Scenario: MDD + Garage Fire Flow

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)	Pressure (Minimum) (psi)	Flow (Total Available) (gpm)	Flow (Total Needed) (gpm)	Fire Flow (Available) (gpm)
J-1	40.40	0	199.74	69	69	(N/A)	(N/A)	(N/A)
J-2	42.10	0	199.37	68	68	(N/A)	(N/A)	(N/A)
J-5	42.00	0	199.37	68	68	(N/A)	(N/A)	(N/A)
J-6	42.00	0	199.74	68	68	(N/A)	(N/A)	(N/A)
J-7	35.00	0	193.75	69	69	(N/A)	(N/A)	(N/A)
Garage Fire	35.00	1,313	192.84	68	68	(N/A)	(N/A)	(N/A)
BLDG Fire	35.00	0	193.75	69	69	(N/A)	(N/A)	(N/A)
BLDG DW	35.00	370	197.07	70	70	(N/A)	(N/A)	(N/A)

FlexTable: Hydrant Table

Active Scenario: Hydrant

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
H-1	40.40	1,625	94.55	23
H-2	42.10	1,625	106.25	28

Appendix E – Sewer Capacity Calculations

Worksheet for 8" PVC Min Slope

Project Description	
Friction Method	Manning Formula
Solve For	Discharge

Input Data		
Roughness Coefficient	0.013	
Channel Slope	0.520	%
Normal Depth	5.20	in
Diameter	8.0	in

Results		
Discharge	295.82	gpm
Flow Area	0.2	ft²
Wetted Perimeter	1.3	ft
Hydraulic Radius	2.31	in
Top Width	0.64	ft
Critical Depth	4.59	in
Percent Full	65.0	%
Critical Slope	0.757	%
Velocity	2.74	ft/s
Velocity Head	0.12	ft
Specific Energy	0.55	ft
Froude Number	0.787	
Maximum Discharge	420.70	gpm
Discharge Full	391.09	gpm
Slope Full	0.298	%
Flow Type	Subcritical	

GVF Input Data		
Downstream Depth	0.00	in
Length	0.0	ft
Number Of Steps	0	

GVF Output Data		
Upstream Depth	0.00	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.0	%
Normal Depth Over Rise	65.0	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	5.20	in
Critical Depth	4.59	in
Channel Slope	0.520	%
Critical Slope	0.757	%

Worksheet for 8" PVC Max Slope

Project Description	
Friction Method	Manning Formula
Solve For	Discharge

Input Data		
Roughness Coefficient	0.013	
Channel Slope	1.380	%
Normal Depth	5.20	in
Diameter	8.0	in

Results		
Discharge	481.92	gpm
Flow Area	0.2	ft²
Wetted Perimeter	1.3	ft
Hydraulic Radius	2.31	in
Top Width	0.64	ft
Critical Depth	5.90	in
Percent Full	65.0	%
Critical Slope	0.988	%
Velocity	4.47	ft/s
Velocity Head	0.31	ft
Specific Energy	0.74	ft
Froude Number	1.282	
Maximum Discharge	685.34	gpm
Discharge Full	637.11	gpm
Slope Full	0.790	%
Flow Type	Supercritical	

GVF Input Data		
Downstream Depth	0.00	in
Length	0.0	ft
Number Of Steps	0	

GVF Output Data		
Upstream Depth	0.00	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.0	%
Normal Depth Over Rise	65.0	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	5.20	in
Critical Depth	5.90	in
Channel Slope	1.380	%
Critical Slope	0.988	%